

## **ABSTRACT**

The present invention relates to a computational tool that allows to evaluate the degradation of cement-based materials under various types of chemical attacks such as sulfates, chlorides, and plain water. It is based on the physical principles of ionic mass conservation and chemical equilibrium between a solution and different solid phases. The effect of the dissolution or the precipitation of solid phases on the transport coefficients is considered. A method for determining an ion concentration in solution of at least two ions capable of undergoing transport in a cement-based material under a chemical attack and a solid phase profile for at least one component of said cement-based material is provided. A method for determining a diffusion coefficient for each of at least two ions capable of undergoing transport in a cement-based material is also provided.